DRAFT SNOHOMISH BASIN FLOODPLAIN ACQUISITION STRATEGY PHASE I SUMMARY DOCUMENT

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INTRODUCTION:

The Snohomish Floodplain Acquisition Strategy provides guidance to watershed stakeholders as they implement the Snohomish River Basin Salmon Conservation Plan. It provides a framework to prioritize parcels within the Snohomish Basin for the conservation and restoration of floodplain and instream natural processes. The initial phase of the strategy includes the Skykomish River Basin, the Pilchuck River, and the mainstem Snohomish River upstream of the Pilchuck River. In the future, the strategy will be expanded to include the Snoqualmie Basin, and the Snohomish Mainstem/Estuary downstream of the Pilchuck River.

The long term goal is a corridor of protected lands along the Snohomish and its major tributaries where floodplain and riverine processes are allowed to function naturally. This corridor will facilitate accelerated implementation of project types and quantities identified in the Conservation Plan, while protecting the floodplain from development and securing treaty protected resources. The corridor will also provide increased flood storage and conveyance, reduce infrastructure in the floodplain, increase human safety, and decrease flood damage claims along the Snohomish.

Central to the acquisition strategy is a GIS tool to prioritize floodplain areas for conservation or restoration actions. The tool development involved dividing the active floodplain of the Snohomish River into “floodplain units”, or FPUs. Floodplain Units are those discrete portions of the floodplain that are expected to be affected as a “unit” if channel migration is allowed to resume unencumbered. FPUs were created based on floodplain elevation (relative to site specific FEMA 100-year flood elevations) and geomorphology. Major transportation corridors in the floodplains (RR grades, state Highways, etc.) constrained the FPUs further than elevation alone would dictate, but this measure of pragmatism is necessary to ensure progress in a reasonable time frame (decades). The Phase I geographic extent of the Strategy encompasses approximately 19,000 acres (30 square miles). A total of 205 FPUs were delineated ranging from 5 to approximately 2,000 acres in size.

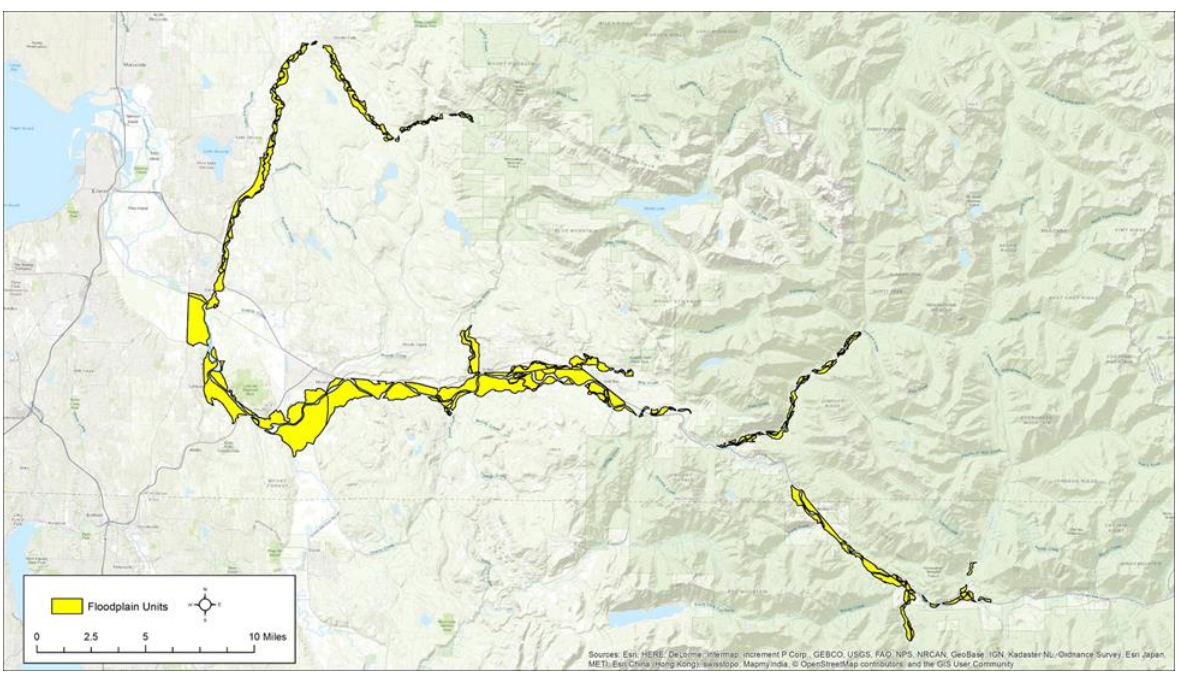

Figure 1. Floodplain Units delineated within the Phase I project extent.

FPU RANKING METRICS:

FPUs are ranked for conservation or restoration themed acquisitions by the scoring and weighting a suite of metrics related to FPU importance, acquisition feasibility, and degradation. All FPUs in this analysis are considered high priority areas for acquisition, and the GIS tool merely differentiates among this overall high priority area.

Table 1. FPU ranking Categories, Metrics, and Scoring criteria.

Category	FPU Metric	Scoring Criteria
Importance	Relative Elevation	FPU Elevation Relative to the 100-Year Flood Elevation
	Flow Importance	Delivery, Discharge, Recharge, & Surface Storage
	Sub-Basin Strategy Group	FPU in Primary or Secondary Strategy Group
	Channel Frontage	Floodplain Channels and River Frontage
Feasibility	Land Use Type	Land Use Compatibility with Restoration/Conservation
	Number of Landowners	Number of Landowners in the FPU
	Landowner Density	Density of Landowners in the FPU
Degradation	Armoring	Percentage of FPU River Frontage Armored
	Channel Constriction	Actual BFW Compared to Expected BFW
	Sinuosity	River Centerline Vs. Euclidean Distance
	Water & Vegetation Cover	Percent Course Vegetation and Water Cover
	Flow Degradation	Delivery, Discharge, Recharge, & Surface Storage

IMPORTANCE METRICS:

Importance Metrics are intended to identify the relative importance of individual FPUs to natural process function including the existence and creation of habitat, water quality, and water quantity.

Table 2. Importance Metrics and Scoring Criteria.

Category	FPU Metric	Scoring Criteria
Importance	Relative Elevation	FPU Elevation Relative to the 100-Year Flood Elevation
	Flow Importance	Delivery, Discharge, Recharge, & Surface Storage
	Sub-Basin Strategy Group	FPU in Primary or Secondary Strategy Group
	Channel Frontage	Floodplain Channels and River Frontage

AVERAGE RELATIVE ELEVATION

Premise: Floodplain Units having a lower average depth relative to the FEMA 100-year flood elevation are more desirable targets for restoration/conservation.

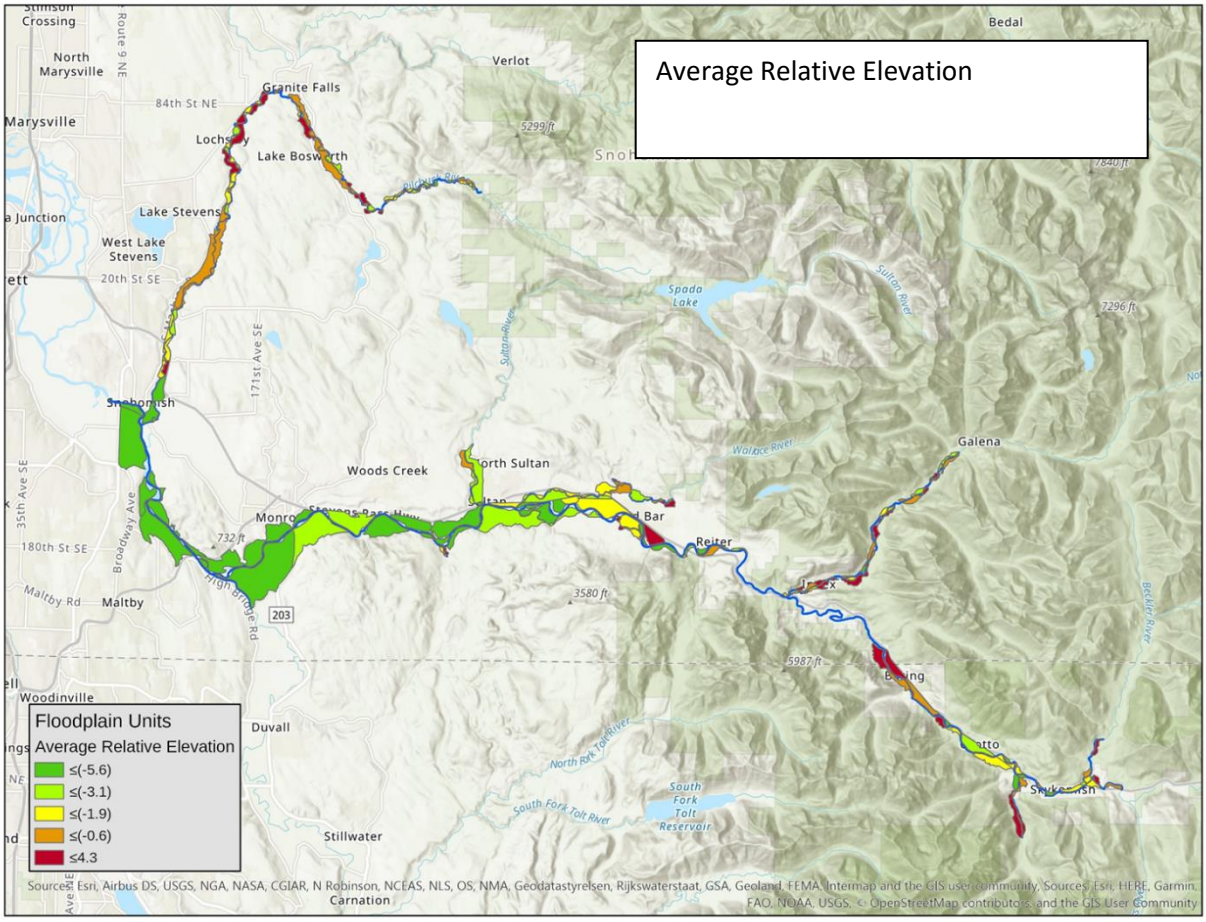

Figure 2. FPU Average Relative Elevation.

FLOW IMPORTANCE

Premise: Floodplain Units of more importance to water flow quantity and timing are more desirable targets for restoration/conservation.

This data was derived from water flow model results produced specifically for this project associated with the Puget Sound Watershed Characterization Project in collaboration with the Washington State Department of Ecology.

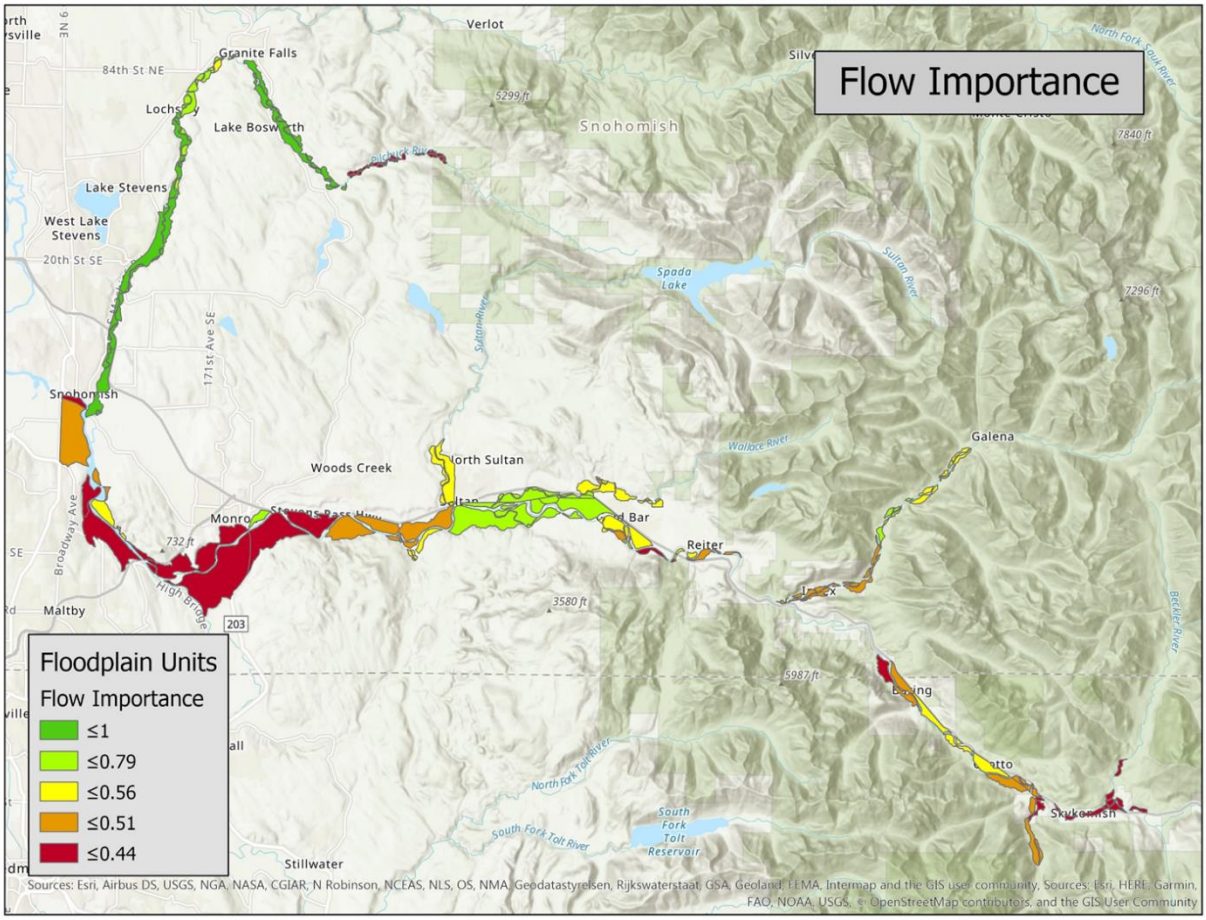

Figure 3. FPU Flow Importance.

SUB-BASIN STRATEGY GROUP

Premise: Primary strategy groups as identified in the Snohomish River Basin Salmon Conservation Plan are more desirable targets for restoration/conservation than secondary groups.

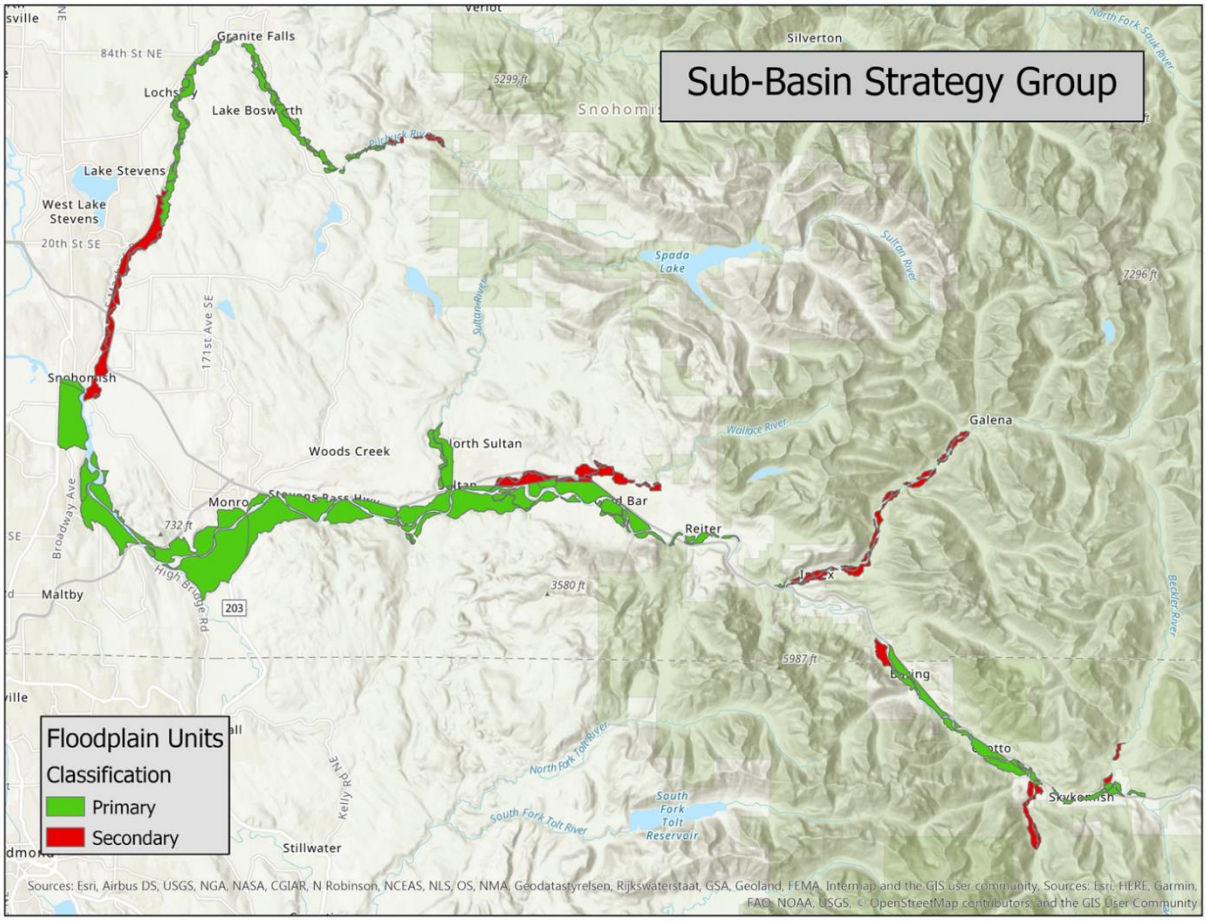

Figure 4. FPRU Primary and Secondary Strategy Groups

CHANNEL FRONTAGE

Premise: Floodplain Units with a higher length of river frontage and potential floodplain channels are more desirable targets for restoration/conservation.

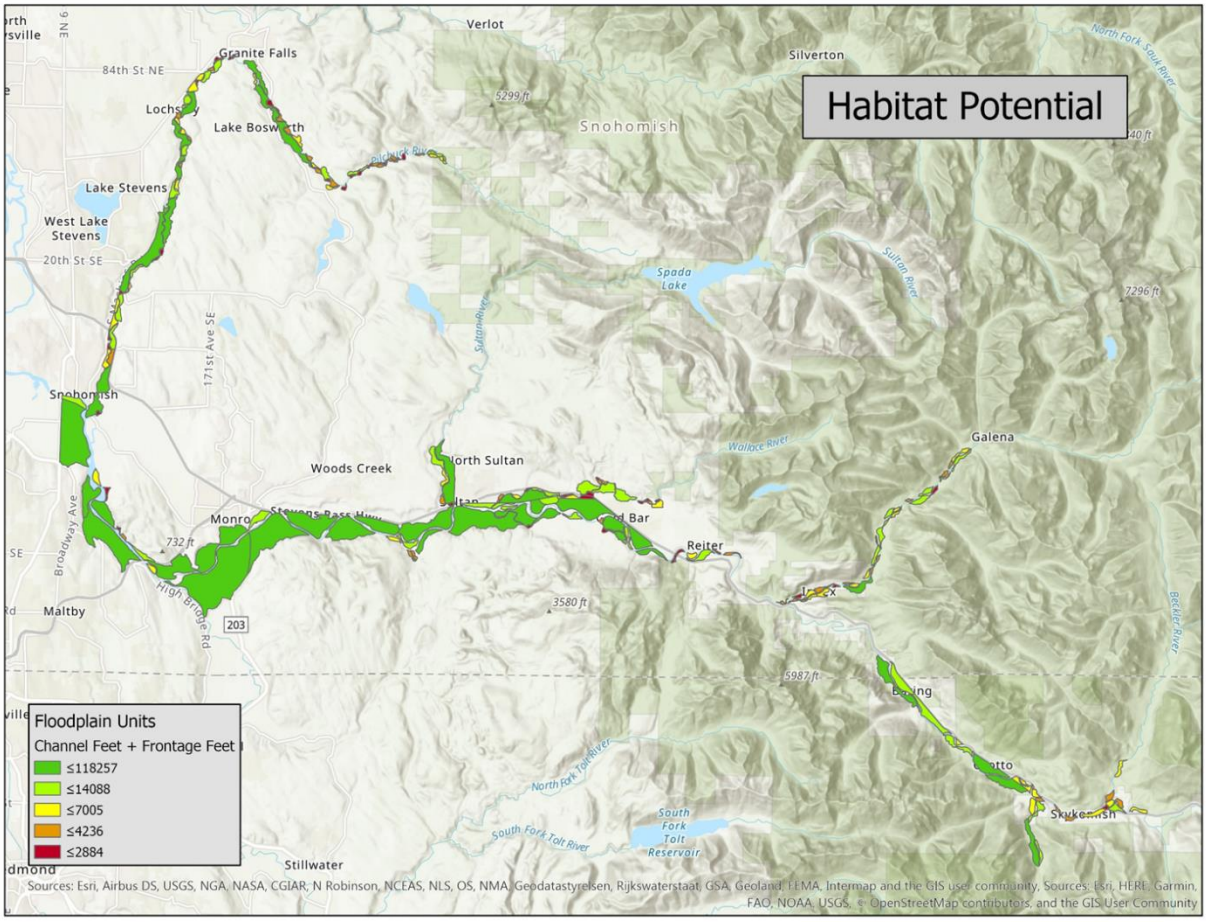

Figure 5. FPU Channel Frontage Feet.

FEASIBILITY METRICS:

Feasibility Metrics are intended to identify the relative feasibility of acquiring and conserving/restoring an entire FPU.

Table 3. Feasibility Metrics and Scoring Criteria.

Category	FPU Metric	Scoring Criteria
Feasibility	Land Use Type	Land Use Compatibility with Restoration/Conservation
	Number of Landowners	Number of Landowners in the FPU
	Landowner Density	Density of Landowners in the FPU

LAND USE TYPES

Premise: Floodplain Units having a larger percentage of area in land uses more compatible with restoration/conservation (i.e. forestry, open space, agricultural, etc.) are more desirable targets for restoration/conservation.

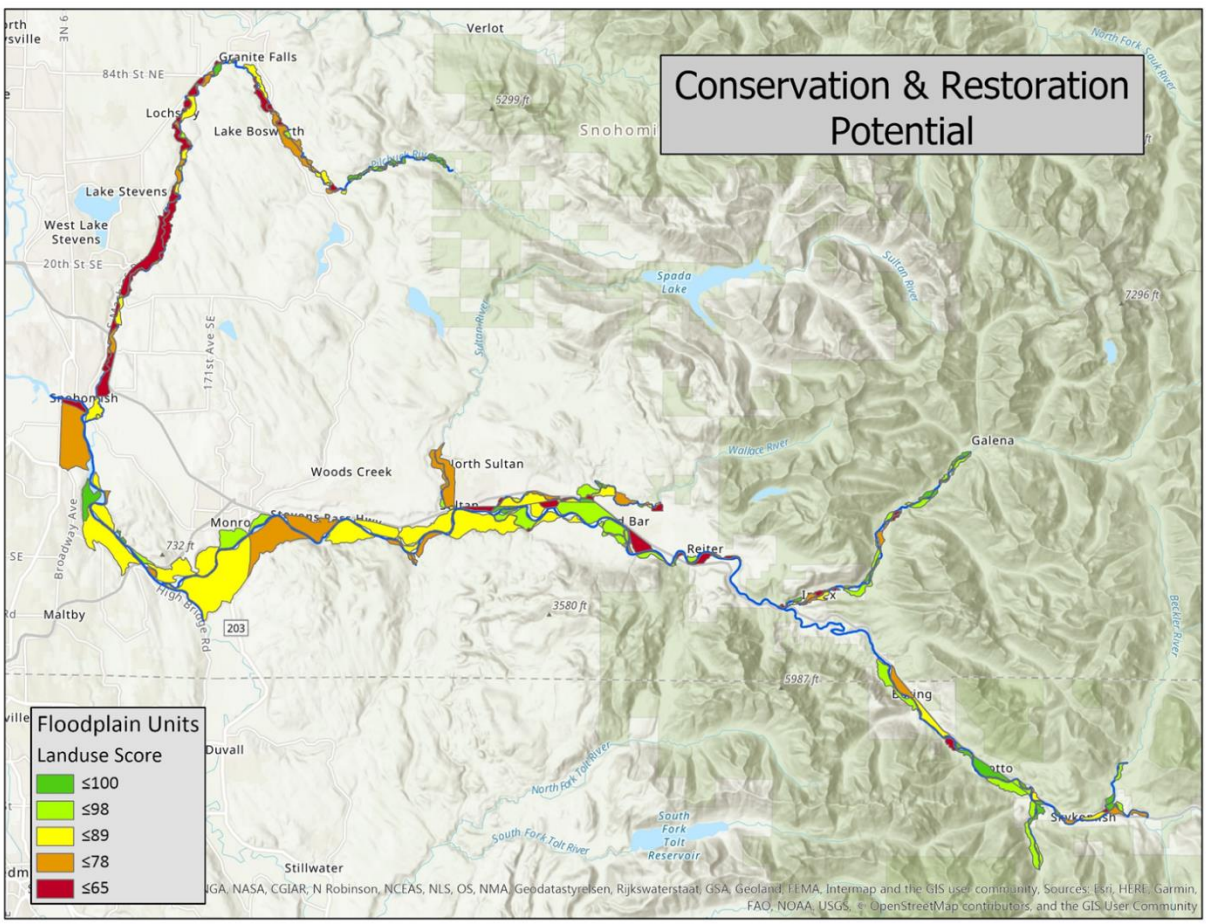

Figure 6. FPU Land Use Types Scores.

NUMBER OF LANDOWNERS

Premise: Floodplain Units held by fewer landowners are more desirable targets for conservation/restoration.

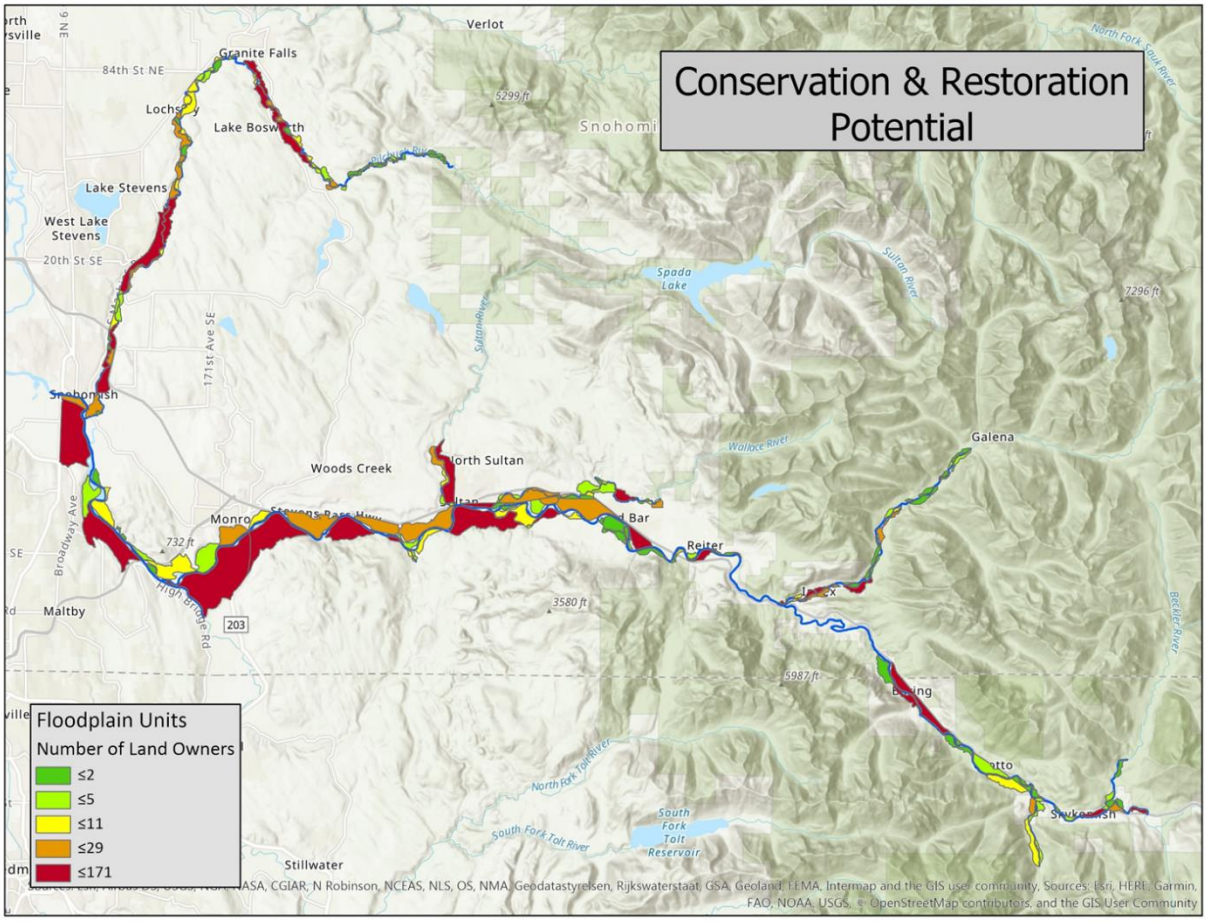

Figure 7. FPU Number of Landowners.

DENSITY OF LANDOWNERS

Premise: Floodplain Units with a lower density of landowners are more desirable targets for conservation/restoration.

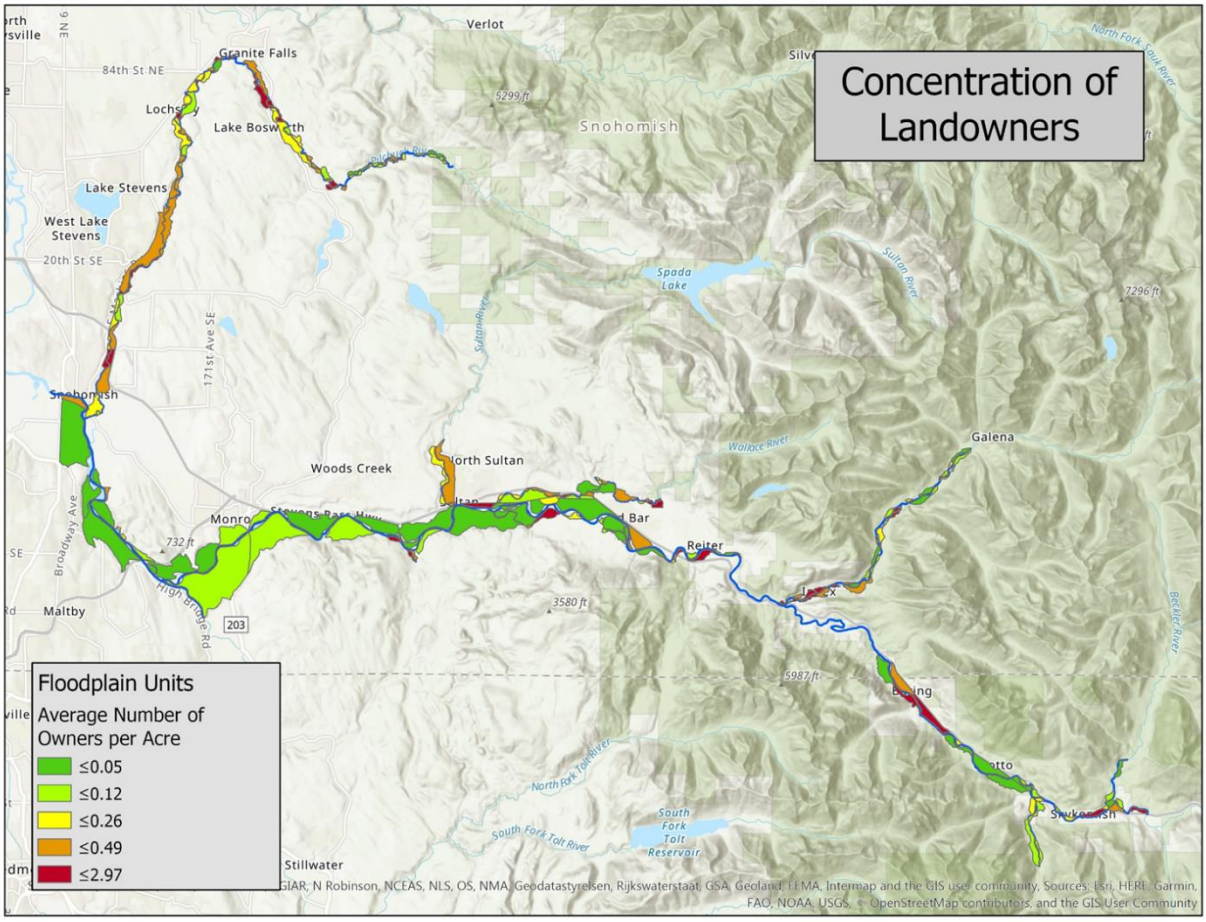

Figure 8. FPU Density of Landowners.

DEGRADATION METRICS:

Degradation Metrics are intended to identify the relative degradation of individual FPUs, which inversely rank FPUs for restoration or conservation values.

Table 4. Degradation Metrics and Scoring Criteria.

Category	FPU Metric	Scoring Criteria
Degradation	Armoring	Percentage of FPU River Frontage Armored
	Channel Constriction	Actual BFW Compared to Expected BFW
	Sinuosity	River Centerline Vs. Euclidean Distance
	Water & Vegetation Cover	Percent Course Vegetation and Water Cover
	Flow Degradation	Delivery, Discharge, Recharge, & Surface Storage

BANK ARMORING

Premise: Floodplain Units with a greater proportion of armoring are more desirable targets for restoration. Floodplain units with a lesser proportion of armoring are more desirable targets for conservation.

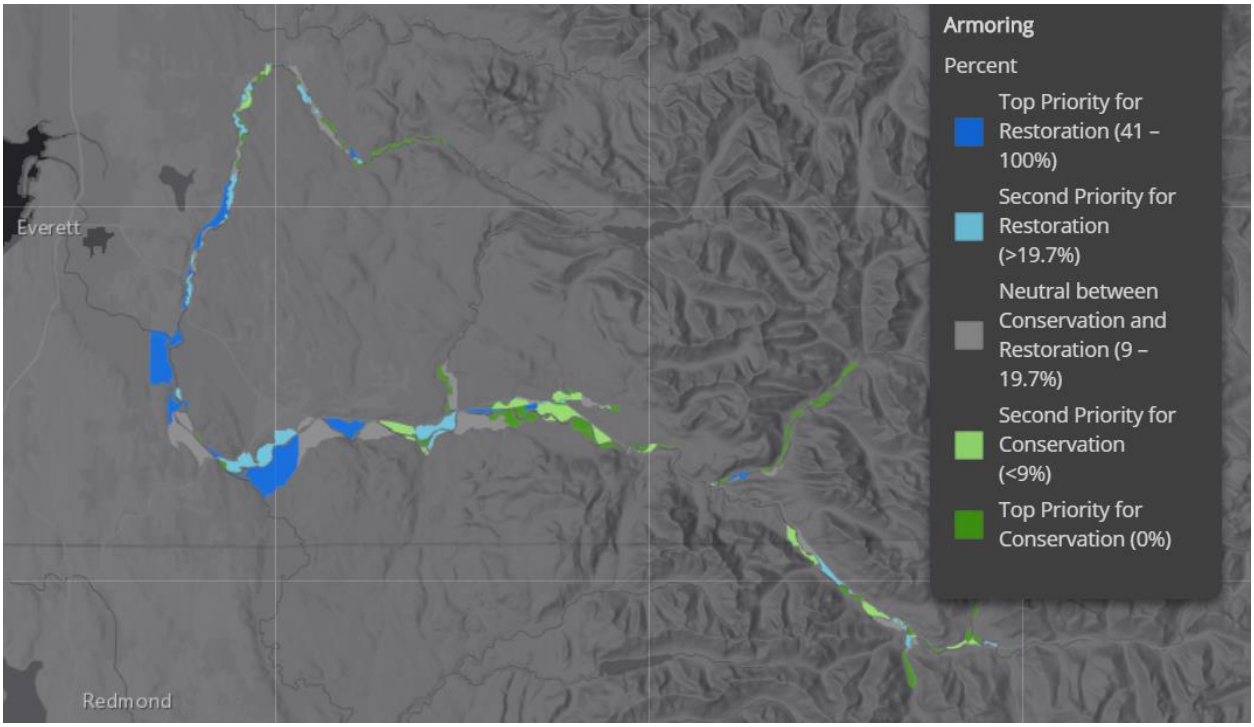

Figure 9. FPU Armoring Scores.

CHANNEL CONSTRICTION

Premise: Floodplain Units along more constricted river channels are more desirable targets for restoration. Floodplain units along less constricted river channels are more desirable targets for conservation.

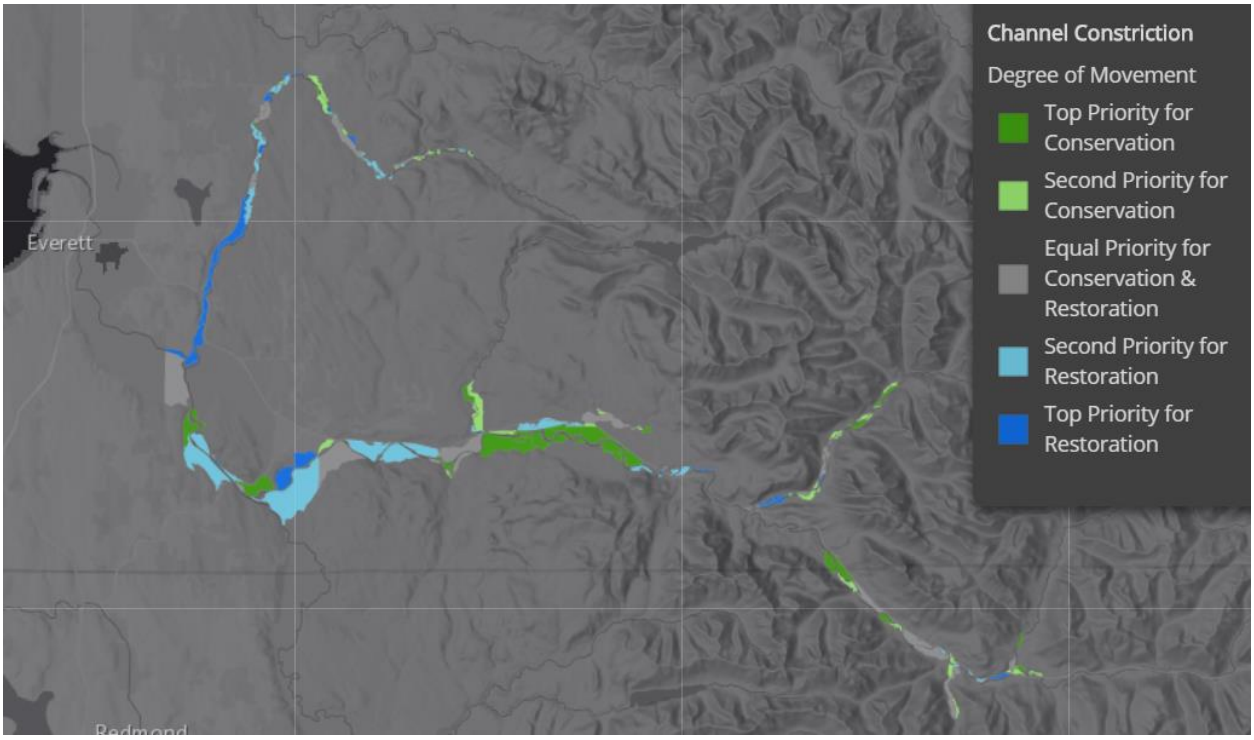

Figure 10. FPU Channel Constriction Scores.

CHANNEL SINUOSITY

Premise: Floodplain Units along less sinuous river channels are more desirable targets for restoration. Floodplain units along more sinuous river channels are more desirable targets for conservation.

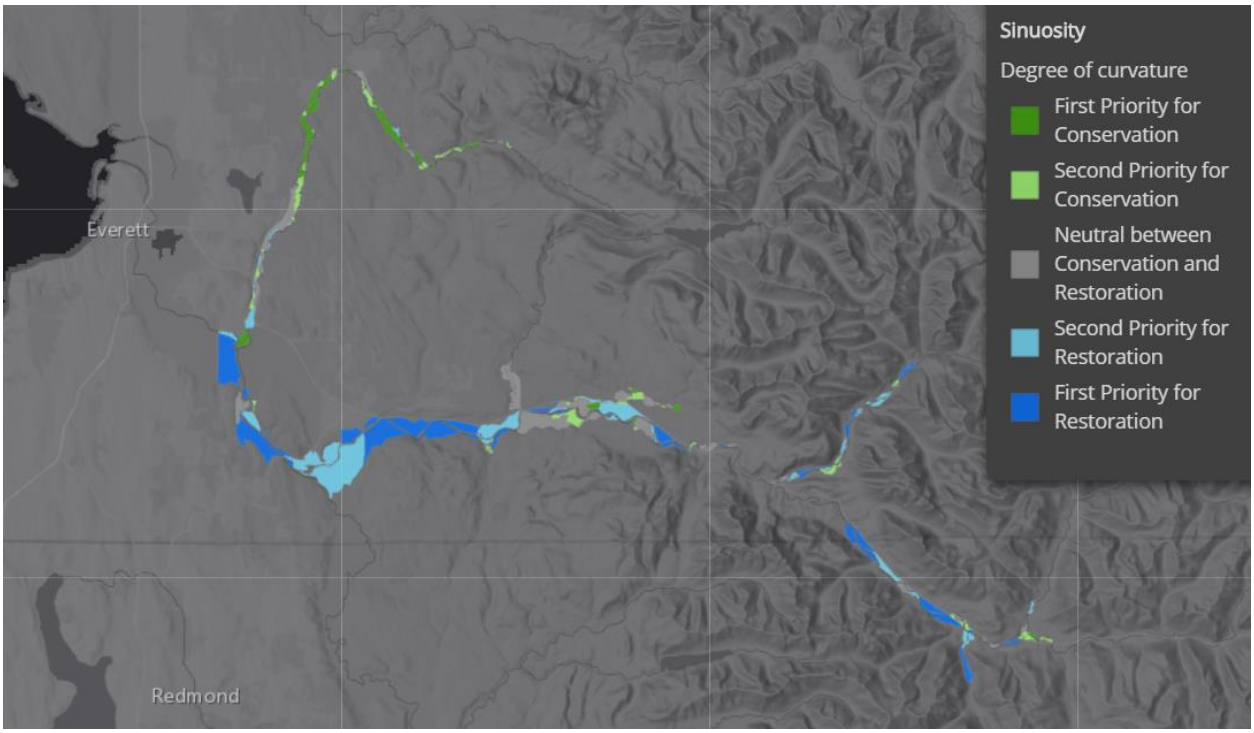

Figure 11. FPU Sinuosity Scores.

WATER AND VEGETATION COVER

Premise: Floodplain Units with lower water and course vegetation coverage are more desirable targets for restoration. Floodplain units with higher water and course vegetation coverage are more desirable targets for conservation.

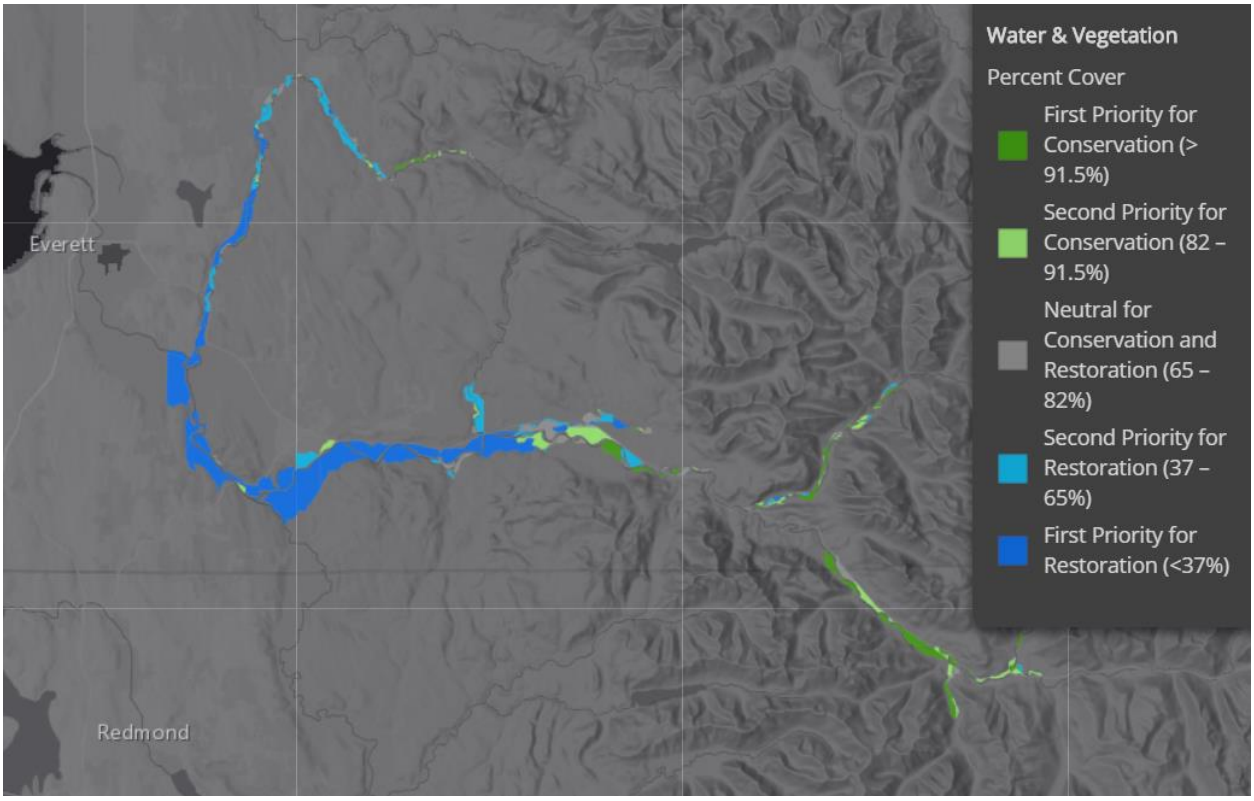

Figure 12. FPU Water and Vegetation Cover Scores.

FLOW DEGRADATION

Premise: Floodplain Units with more degraded water flow quantity and timing are more desirable targets for restoration. Floodplain Units with less degraded water flow quantity and timing are more desirable targets for conservation.

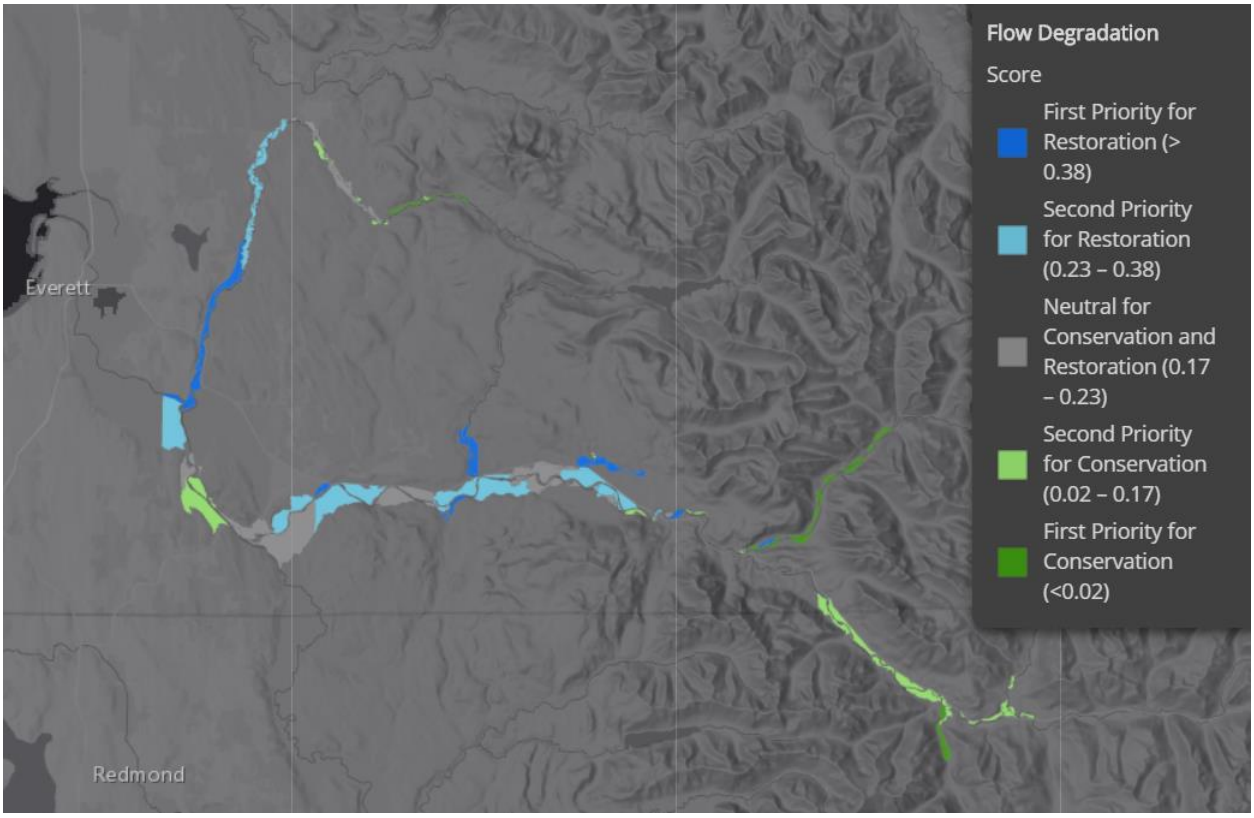

Figure 13. FPU Flow Degradation Scores.

FPU SCORING:

Each FPU received three scores including a Base Score, a Restoration Score, and a Conservation Score:

Table 5. FPU Scoring Table.

Score	Scoring Metric Categories
Base Score	Importance + Feasibility
Restoration Score	Importance + Feasibility + Degradation
Conservation Score	Importance + Feasibility + Inverse Degradation

FPU BASE SCORE:

Base Scores were derived by computing, weighting and combining FPU scores for only Importance and Feasibility metrics. These "Base Scores" provide an underlying score that remains constant between Conservation and Restoration Scores.

FPU RESTORATION SCORE:

Restoration Scores were derived by computing, weighting, and combining FPU scores for all metrics. For this score, degradation metrics receive higher scores associated with more degraded conditions (more armoring, more channel constriction, less sinuosity, less cover, and more flow degradation).

FPU CONSERVATION SCORE:

Conservation Scores were derived by computing, weighting, and combining FPU scores for all metrics. For this score, degradation metrics receive higher scores associated with less degraded conditions (less armoring, less channel constriction, more sinuosity, more cover, and less flow degradation).

FPU METRIC WEIGHTING:

Weighting was applied to the Base Score and Restoration/Conservation Score Metrics based on the relative importance of the metric to natural process function, feasibility of acquisition, or degradation of natural process function. Base Score Metrics were weighted with Importance metrics comprising 60% and Feasibility metrics comprising 40% of the total Base Score. Conservation and Restoration Score Metrics were identically weighted, with Importance metrics comprising 42.9%, Feasibility metrics comprising 28.6%, and Degradation metrics comprising 28.6% of the total Conservation and Restoration Scores. Individual metrics were weighted per Table 6 below. Relative Elevation was weighted heavily in this analysis with the premise that lower relative elevations promote more frequent inundation, habitat formation, and active natural process. Armoring was also weighted heavily with the premise that armoring can significantly alter floodplain connectivity and natural process function.

Table 6. Metric Weighting for Base and Restoration/Conservation Score Metrics.

Category	FPU Metric	Base Score Metric Weighting	Rest./Cons. Score Metric Weighting
Importance	Relative Elevation	32.4%	23.2%
	Flow Importance	9.7%	6.9%
	Sub-Basin Strategy Group	8.1%	5.8%
	Channel Frontage	9.7%	6.9%
Feasibility	Land Use Type	13.3%	9.5%
	Number of Landowners	13.3%	9.5%
	Landowner Density	13.3%	9.5%
Degradation	Armoring	N/A	10.2%
	Channel Constriction	N/A	3.1%
	Sinuosity	N/A	5.1%
	Water & Vegetation Cover	N/A	5.1%
	Flow Degradation	N/A	5.1%

PARCEL ADJACENCY SCORING

A second tier of scoring will occur when prioritizing acquisition of specific parcels when multiple parcels are available in a funding limited situation. In conjunction with underlying FPU scores, adjacency of specific parcels to other Protected Lands will be determined and compared. This information may include the number of adjacent Protected Parcels, adjacency to a River, the percent of the parcel perimeter adjacent to Protected Lands, and/or the length of the perimeter adjacent to Protected Lands. It is recommended that the Snohomish Basin Salmon Recovery Technical Committee or subcommittee conduct this discussion and provide funding allocation recommendations for prioritized parcel acquisitions while considering FPU scores, parcel adjacency metrics, and site specific or logistical considerations.

For these purposes, the following definitions apply:

PROTECTED LANDS:

Protected Parcels and Rivers

PROTECTED PARCELS:

Under a conservation easement, managed under State, Federal, or industrial forest rules, or otherwise owned by a governmental entity or land trust AND managed for natural resources protection and long-term riverine/floodplain natural process function.

RIVERS:

Digitized active channels, adjacent unparcelled lands, and unparcelled oxbow, lake, and pond features.

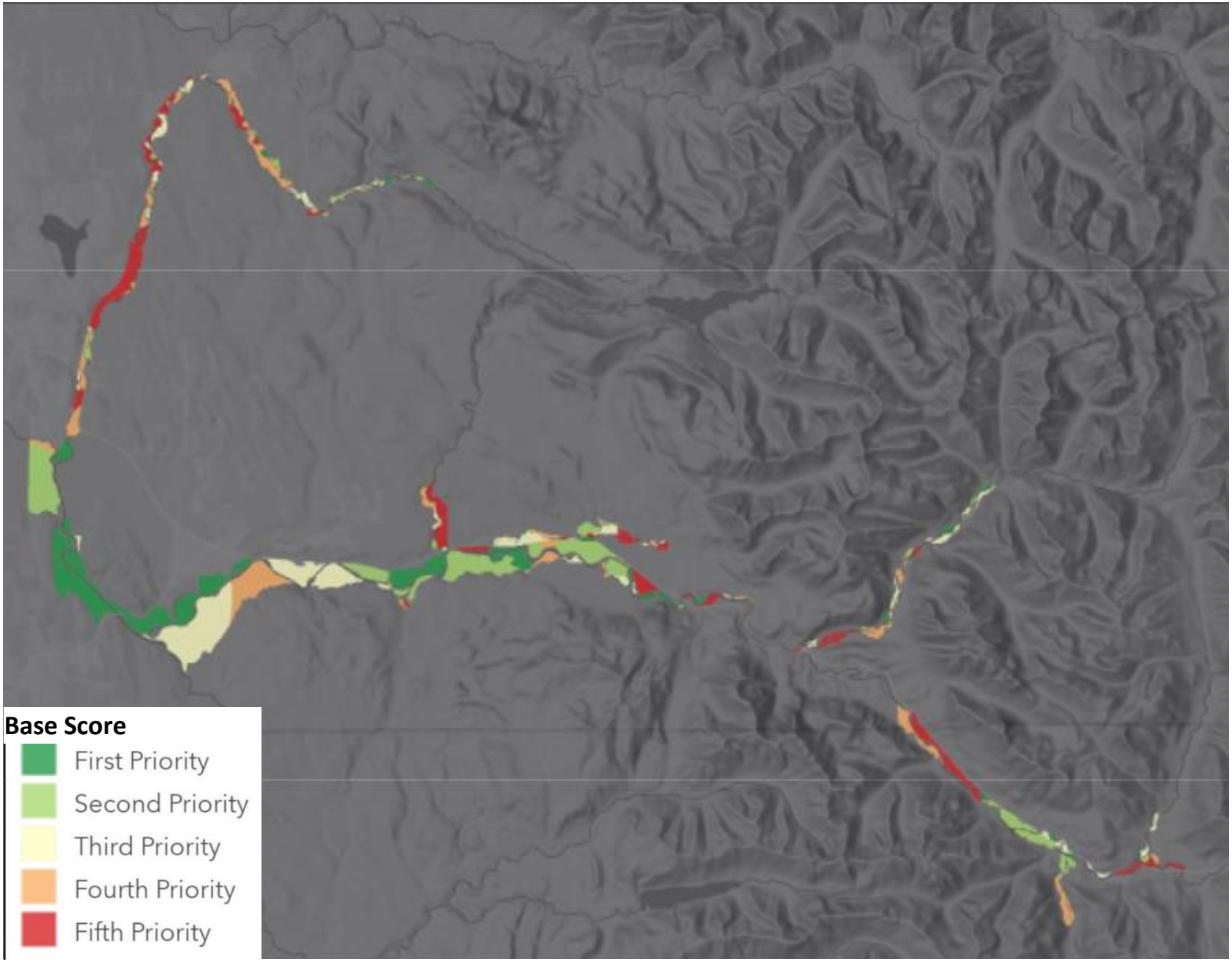

Figure 14. Weighted FPU Base Scores.

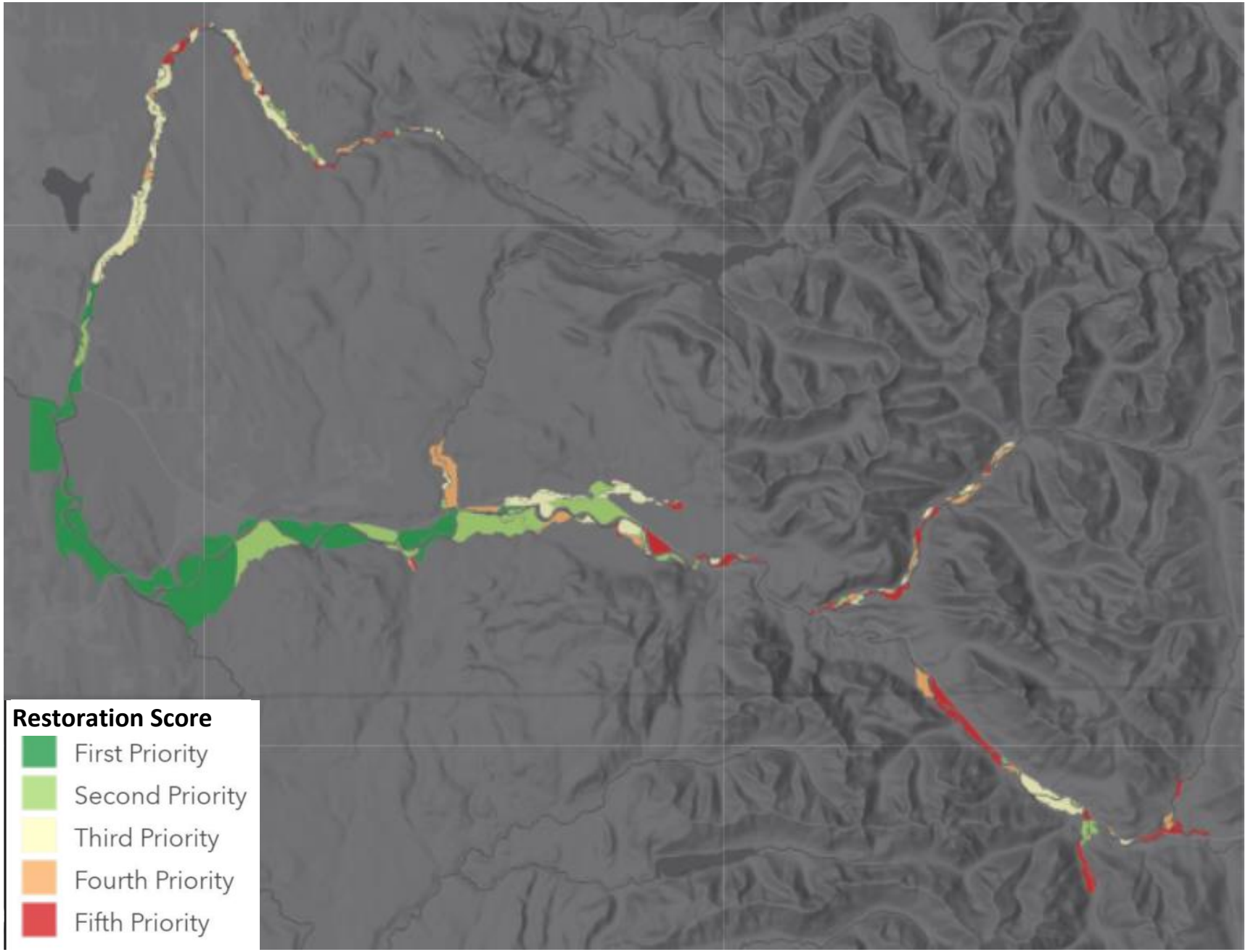

Figure 15. Weighted FPU Restoration Scores.

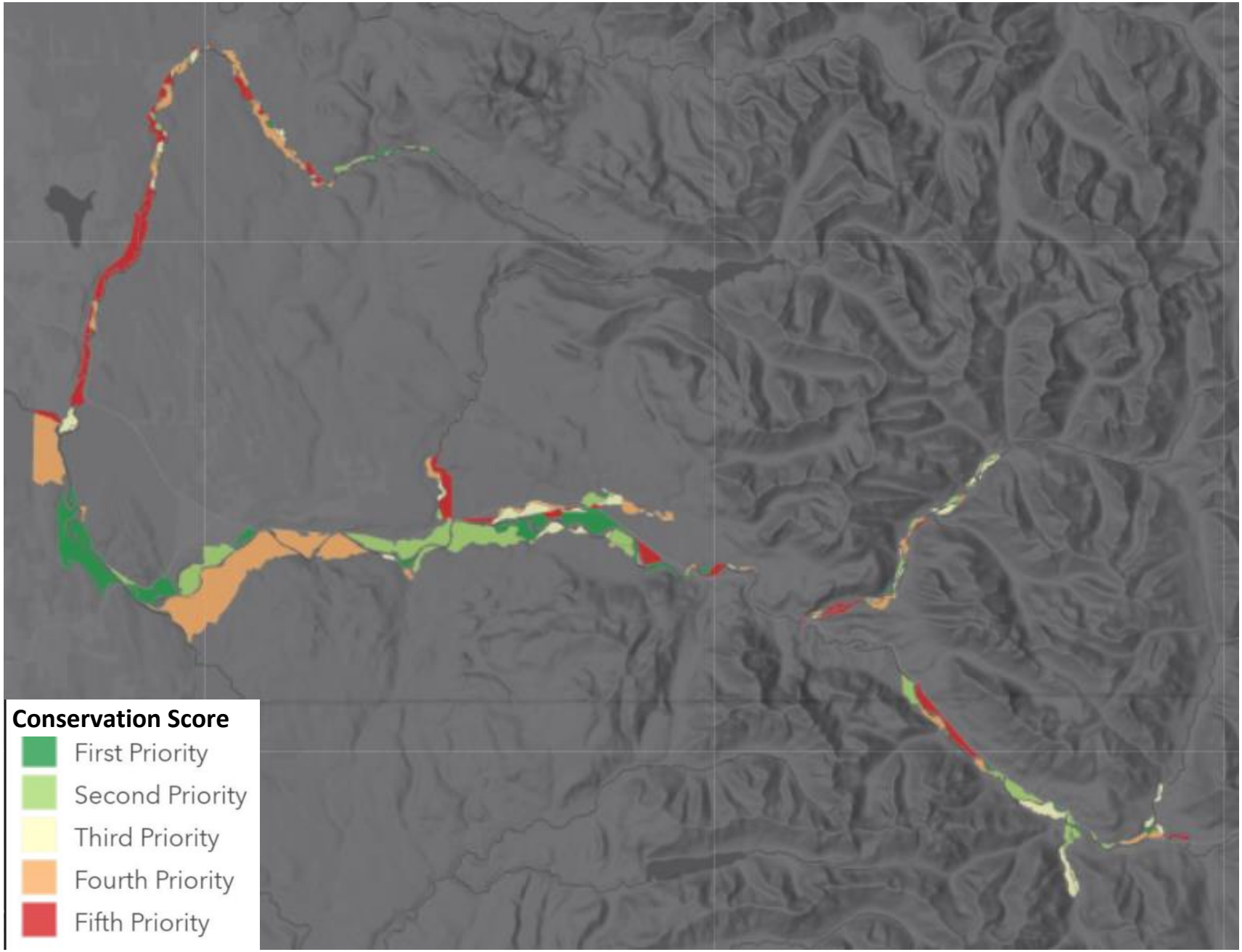

Figure 16. Weighted FPU Conservation Scores

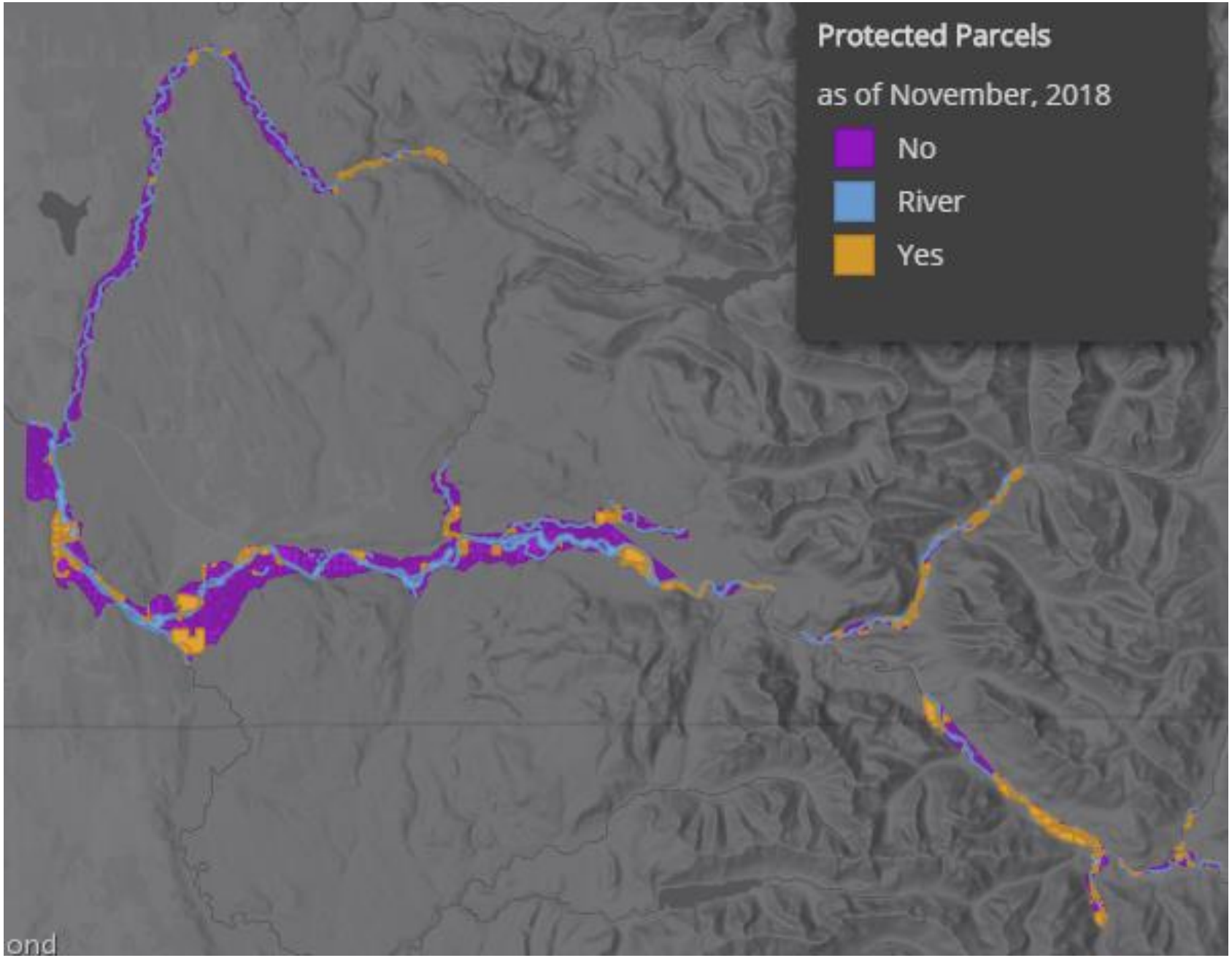

Figure 17. Protected Parcels and Rivers for Parcel Adjacency Assessments.